

Alleviating acid soil infertility constrains using basalt, ground magnesium limestone and gypsum in a tropical environment.

ABSTRACT

Ultisols and Oxisols in the tropical regions are often acidic, with high Al but deficient in Ca and/or Mg. This limits maize production. Studies were conducted to investigate the efficacy of basalt, ground magnesium limestone (GML) and gypsum as acid soil ameliorants. Results showed that basalt improved soil fertility by increasing soil pH, cation exchange capacity (CEC) and exchangeable Ca, Mg and K and available P, with a concomitant lowering of exchangeable Al. In the soils treated with GML, Ca remained in the zone of incorporation. When GML was applied together with gypsum, Ca moved deeper into the soil profile. Sulfate, SO_4^{2-} , adsorption onto the surfaces of oxides resulted in an increase in pH and negative charge. The increase in pH was due to the replacement of OH^- by SO_4^{2-} . Beneficial effects of GML application at the rate of 4 t ha⁻¹ lasted for about 8 years with the effect being comparable to application of 1 t GML ha⁻¹ annually.

Keyword: Basalt; Ground magnesium limestone; Gypsum; Oxisol; Soil acidity; Ultisols.